Adaptation of Projection Profile Algorithm for Skewed Handwritten Text Line Detection

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Abstract : Text line segmentation is an important step in document image processing. It represents a labeling process that assigns the same label using distance metric probability to spatially aligned units. Text line detection techniques have successfully been implemented mainly in printed documents. However, processing of the handwritten texts especially unconstrained documents has remained a key problem. This is because the unconstrained hand-written text lines are often not uniformly skewed. The spaces between text lines may not be obvious, complicated by the nature of handwriting and, overlapping ascenders and/or descenders of some characters. Hence, text lines detection and segmentation represents a leading challenge in handwritten document image processing. Text line detection methods that rely on the traditional global projection profile of the text document cannot efficiently confront with the problem of variable skew angles between different text lines. Hence, the formulation of a horizontal line as a separator is often not efficient. This paper presents a technique to segment a handwritten document into distinct lines of text. The proposed algorithm starts, by partitioning the initial text image into columns, across its width into chunks of about 5% each. At each vertical strip of 5%, the histogram of horizontal runs is projected. We have worked with the assumption that text appearing in a single strip is almost parallel to each other. The algorithm developed provides a sliding window through the first vertical strip on the left side of the page. It runs through to identify the new minimum corresponding to a valley in the projection profile. Each valley would represent the starting point of the orientation line and the ending point is the minimum point on the projection profile of the next vertical strip. The derived text-lines traverse around any obstructing handwritten vertical strips of connected component by associating it to either the line above or below. A decision of associating such connected component is made by the probability obtained from a distance metric decision. The technique outperforms the global projection profile for text line segmentation and it is robust to handle skewed documents and those with lines running into each other.

Keywords : connected-component, projection-profile, segmentation, text-line